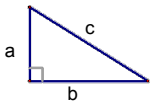
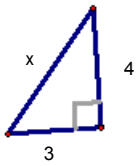
7.2 The Pythagorean Theorem

Thm 7.4--The Pythagorean Theorem--In a right triangle, the square of the hypotenuse is equal to the sum of the squares of the legs

$c^2 = a^2 + b^2$



President Garfield



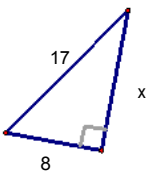
$c^2 = a^2 + b^2$

$x^2 = 3^2 + 4^2$

$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

$x = 5$



$c^2 = a^2 + b^2$

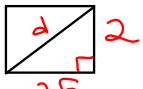
$17^2 = 8^2 + x^2$

$289 = 64 + x^2$

$\sqrt{225} = \sqrt{x^2}$

$15 = x$

Find the diagonal of the rectangle with width of 2 and a length of $2\sqrt{2}$



$d^2 = 2^2 + (2\sqrt{2})^2$

$4 + 4 \cdot 2$

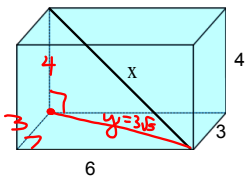
$4 + 8$

$\sqrt{d^2} = \sqrt{12}$

$d = 2\sqrt{3}$

12

4 3



$y^2 = 3^2 + 6^2$
$9 + 36$
$y^2 = 45$
$y = 3\sqrt{5}$

$x^2 = 4^2 + (3\sqrt{5})^2$
$16 + 45$
$x^2 = 61$
$x = \sqrt{61}$

Pythagorean Triples

3 4 5 5 12 13 8 15 17 7 24 25
6 8 10
9 12 15

Theorem 7-5 The Converse of the Pythagorean Theorem--If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle.

$c^2 = a^2 + b^2$ then Right $\triangle$

$c^2 < a^2 + b^2$ then Acute $\triangle$

$c^2 > a^2 + b^2$ then Obtuse $\triangle$

C is the largest number

Examples

3, 7, 8 $8^2 \overset{?}{>} 3^2 + 7^2$
$64 > 9 + 49$
58
Obtuse

8, 16, 17 $17^2 \overset{?}{<} 8^2 + 16^2$
$289 < 64 + 256$
Acute

$\sqrt{5}$ $\sqrt{20}$ 6

$6^2 \overset{?}{>} \sqrt{5}^2 + \sqrt{20}^2$
$36 > 5 + 20$
Obtuse

What type of triangle is $\triangle ABC$?
A(-9, -3)
B(1, -1)
C(-3, -7)